

Past-paper walk-through

Transpiration ■ 8.3

eXercise

Questions in this set

- 0610/22 N25 Q11 ■ 1 mark
- 0610/22 N25 Q12 ■ 1 mark
- 0610/23 N25 Q13 ■ 1 mark
- 0610/41 N25 Q5 ■ 11 marks
- 0610/21 J25 Q13 ■ 1 mark
- 0610/22 J25 Q15 ■ 1 mark
- 0610/22 M25 Q15 ■ 1 mark

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 11

0610/22 N25 ■ Q11 ■ 1 mark

- 11** Which process moves water from the surfaces of the mesophyll cells into the air spaces during transpiration?
- A** active transport
 - B** circulation
 - C** evaporation
 - D** osmosis

Solution 11

Answer: **C**

Why

- Water first evaporates from the wet cell walls of the mesophyll into the air spaces.
- It then diffuses out through the stomata.
- Osmosis moves water *between cells*; the step into the air space is evaporation.

Question 12

0610/22 N25 ■ Q12 ■ 1 mark

12 The mass of water lost from a plant was investigated.

The leaves of the plant were covered with a type of grease that acts as a waterproof barrier.

The environmental conditions remained the same throughout the experiment.

The table shows the results of the investigation.

treatment	mass lost in seven days / g
no grease applied	12.0
grease applied only to the upper surface of every leaf	8.7
grease applied to both surfaces of every leaf	0.0

Question 12

What is the mean daily rate of water loss through the upper surface of the leaves?

- A** 0.47 g/day **B** 1.24 g/day **C** 1.71 g/day **D** 3.30 g/day

Solution 12

Answer: **A**

Why

- Greasing a surface blocks the stomata there, so water cannot escape through it.
- Most stomata are on the *lower* surface of a leaf.
- So greasing the lower surface cuts water loss much more than greasing the upper surface.

Question 13

0610/23 N25 ■ Q13 ■ 1 mark

13 Which environmental conditions will result in the highest rate of transpiration?

	high air humidity	very windy	low air temperature
A	no	no	yes
B	no	yes	no
C	yes	yes	yes
D	yes	no	no

Solution 13

Answer: **B**

Why

- Transpiration is fastest when water evaporates from the leaf most quickly.
- Wind removes the humid air from around the stomata, keeping the gradient steep.
- *Low* humidity and a *high* temperature also speed it up, so high humidity and low temperature both slow it.

Question 5

0610/41 N25 ■ Q5 ■ 11 marks

- 5 A student investigated the effect of humidity on water vapour loss in plant leaves. As water vapour was lost, the mass of the leaves decreased.

Similar-sized leaves were collected from one species of plant.

The leaves were divided into two groups, **A** and **B**. The leaves in group **A** were placed in a low humidity environment and the leaves in group **B** were placed in a high humidity environment. The leaves in each group were kept in their environment for 12 hours.

The temperature in each environment was maintained at 20°C.

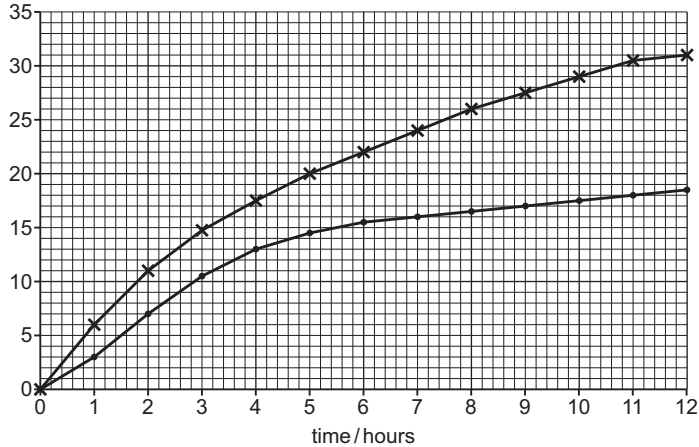
The mass of the leaves in each group was measured at the start of the investigation and then every hour throughout the 12-hour period.

The student calculated the mass of water vapour lost as a percentage of the starting mass of the leaves for each group.

Fig. 5.1 shows the student's results.

Question 5

mass of water
vapour lost from
the leaves as a
percentage of
the starting
mass



Question 5

key

A →✕ low humidity environment

B →● high humidity environment

Fig. 5.1

- (a) (i)** State the name of the process by which water vapour is lost from plant leaves.

Question 5

- (ii) Compare **and** explain the effects of high and low humidity shown in Fig. 5.1.

Question 5

- (iii) The students repeated the investigation at a temperature of 35 °C.

The leaves were kept in a low humidity environment.

Draw a line **on the graph** in Fig. 5.1 to predict the results of this investigation. [1]

- (b) Humans also lose water vapour from their bodies by sweating.

- (i) Explain how sweating helps a person to maintain a constant internal body temperature.

Question 5

(ii) State **one** other way that humans lose water vapour from their bodies.

Question 5

[Total:11]

Solution 5

(a)(i)

Mark scheme

- transpiration / diffusion ;
- 1

Solution 5

(a)(ii) Mark scheme

- any five from:
- comparison
- 1
- both lose mass ;
- 2
- higher humidity, less water vapour is lost ;
- 3
- ref. to steeper rate / greater water lost, initially (for both groups) ;

Solution 5

- 4
- comparative data quote with units ;
- explanation for high humidity
- 5
- (higher humidity) greater amount of water vapour in the atmosphere ;
- 6
- reduced water potential, gradient ;
- 7
- less water vapour lost, through stomata / between guard cells ;
- 5 ora throughout

Solution 5

- 0610/41
- October/November 2025
- Guidance

Solution 5

(a)(iii)

Mark scheme

- line drawn on the graph above the low humidity line ;
- 1

Solution 5

(b)(i) Mark scheme

- any three from:
- glands in the skin produce sweat ;
- sweat on (the surface of) the skin evaporates ;
- using / AW, heat / energy (from the body) ;
- (internal) body temperature, decreases / returns, to a set point ;
- ref. to homeostasis / negative feedback ;
- 3

Solution 5

(b)(ii)

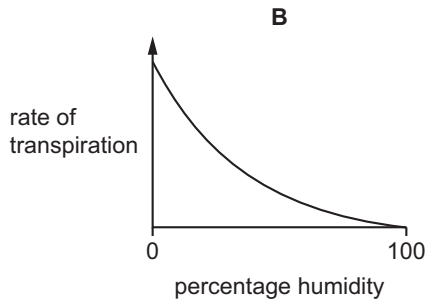
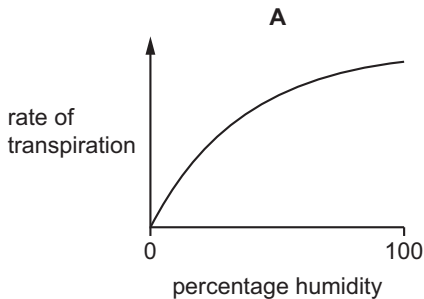
Mark scheme

- expiration / AW ;
- 1
- Guidance

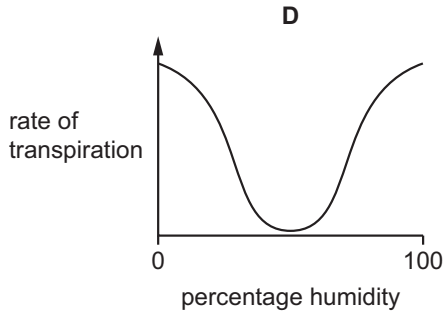
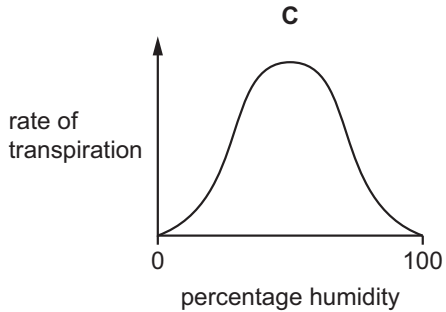
Question 13

0610/21 J25 ■ Q13 ■ 1 mark

13 Which graph shows the effect of humidity in the air on the rate of transpiration in a plant?



Question 13



Solution 13

Answer: **B**

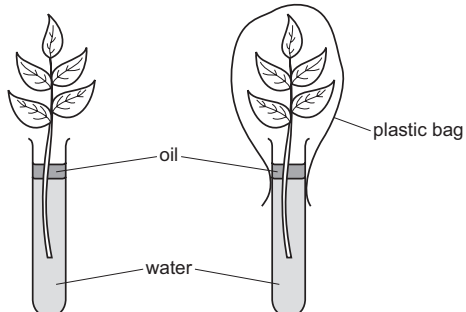
Why

- Transpiration depends on the concentration gradient of water vapour out of the leaf.
- As humidity rises, that gradient gets shallower, so transpiration slows.
- At 100% humidity there is no gradient at all, so the rate falls towards zero.

Question 15

0610/22 J25 ■ Q15 ■ 1 mark

- 15** A student wanted to investigate the effect of humidity on transpiration. She set up two sets of apparatus with identical-sized plants of the same species.



Question 15

—
tube X

—
tube Y

The masses of the water in both tubes were measured at the start of the investigation and again after five days. The table shows the results of the investigation.

tube	mass of the water in the tube at the start/g	mass of the water in the tube at the end/g
X	40.3	34.6
Y	41.0	39.4

Which statement describes and explains these results?

- A** Transpiration in tube Y was higher than in tube X as the plastic bag decreased the humidity.

Question 15

- B** Transpiration in tube Y was higher than in tube X as the plastic bag increased the humidity.
- C** Transpiration in tube Y was lower than in tube X as the plastic bag decreased the humidity.
- D** Transpiration in tube Y was lower than in tube X as the plastic bag increased the humidity.

Solution 15

Answer: **D**

Why

- To test humidity, the humidity must be the only thing that differs between the two sets.
- Everything else – plant species, size, temperature, light and air movement – must be kept the same.
- The oil layer stops water evaporating from the surface of the water rather than through the plant.

Question 15

0610/22 M25 ■ Q15 ■ 1 mark

- 15** Which conditions cause the highest rate of transpiration?
- A** high temperature, high wind speed and high humidity
 - B** high temperature, high wind speed and low humidity
 - C** low temperature, low wind speed and low humidity
 - D** low temperature, low wind speed and high humidity

Solution 15

Answer: **B**

Why

- Transpiration is fastest when evaporation from the leaf is fastest.
- High temperature gives the water molecules more energy and wind removes the humid air.
- *Low* humidity keeps the concentration gradient steep – high humidity would slow it down.